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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20040303

Application Number: 09/471,520
Filing Date: December 23, 1999
Appellant(s): PAPATHOMAS ET AL.

Jack P. Friedman
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07-23-2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. The Issues are Issues 2 and 4 as set forth on page 3 of the Appeal Brief, except that the rejection of claim 13 over Gaku et al in view of McCormick et al is hereby withdrawn because the references do not teach the recited silanes. Gaku et al is considered to be the closest prior art.

The changes are as follows: The rejections of claims 1, 6-8, 13, 16 and 17 under 35 U.S.C. 103(a) as being unpatentable over Ayano et al (4,383,903) in view of McCormick et al (5,215,860) and claims 13-15 and 18 under 35 U.S.C. 103(a) as being unpatentable over Ayano et al (4,383,903) in view of McCormick et al (5,215,860) further in view of Christie et al. or Swei (5,182,173) are hereby withdrawn in order to simplify the issues.

(7) Grouping of Claims

Appellant's brief includes a statement that claims of Groups 1, 2, 8, 9 and 10 in Table 1 on page 4 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8). It is not agreed that claim 17 stands or falls separately because the claim, as written, is not limited to a toughening agent being a polysulfone but includes all the toughening agents set forth in claim 16. Therefore, claims 16 and 17 stand or fall together.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

4,533,727	Gaku et al.	8-1985
5,215,860	McCormick et al.	6-1993
5,250,848	Christie et al.	10-1993
4,709,008	Shimp	11-1987
5,182,173	Swei	01-1993

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 6-8, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaku et al (4,533,727) in view of McCormick et al (5,215,860) and Shimp (4,709,008). Gaku et al disclose cyanate ester compositions comprising photocrosslinking monomers, thermosetting monomers and/or thermoplastic resins (columns 5-7). Gaku et al teach blending compounds "B" with curable resin "A". Compounds B include compounds (B)(iv), which are thermosetting monomers or prepolymers, and

compounds (B)(v), which include rubbers, polysulfone, polyimides, polyesters and other resins. Fillers, such as silica, and reinforcing agents may be added; however, Gaku et al do not mention particle size (column 8). Photoinitiators, including diphenyl iodonium, and heat curing catalysts are taught in columns 5-6 but do not include organometallic photoinitiators.

McCormick et al, in analogous art, teach that an organometallic compound curing agent can be used in an "energy-curable' cyanate composition. McCormick et al teach that organometallic compounds provide curing, including radiation curing, at lower temperatures or faster rates than previous catalysts, allow easier coating, provide temperature control and can be used to provide 100% reactive compositions (column 2, line 61, to column 3, line 20). Shimp discloses cyanate ester compositions that can be cured by heat and comprise catalysts such as zinc octanoate, etc. (column 3, lines 42-64). Additives taught include thermoplastic resin toughenens, reinforcing fibers, colloidal silica, mineral fillers and pigments (column 4, lines 27-32). Shimp does not mention particle size of fillers.

It would have been obvious to one skilled in the art at the time of the invention to employ organometallic catalysts and radiation curing, as taught by McCormick et al, with the compositions disclosed by Gaku et al. Gaku et al provide motivation by teaching that photoinitiators and radiation curing can be used. McCormick et al teach the advantages of the organometallic salt photoinitiators for curing cyanate ester compositions. With respect to claims 16 and 17, It would have been obvious to one skilled in the art at the time of the invention to include thermosetting prepolymers disclosed as (B)(iv) and/or rubbers or resins disclosed as (B)(v) in the compositions taught by Gaku et al since Gaku et al teach blending these compounds with curable resin A. One skilled in the art at the time of the invention would have been motivated by an expectation of providing toughening to the curable resin since thermoplastics, thermosetting and rubber materials such as those disclosed by Gaku et al are well known in the art for providing toughening to curable compositions. Shimp provides additonal motivation by teaching that thermoplastic resin toughenens can be added to analogous compositions of cyanate esters.

Claims 13-15 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaku et al (4,533,727) in view of McCormick et al (5,215,860) and Shimp (4,709,008), as applied to claims 1, 7 and 8 above, and further in view of Christie et al (5,250,848) or Swei (5,182,173). Gaku et al do not mention adding surface treating agents or silane compounds corresponding to those set forth in claims 13, 14 and 18, however, Gaku et al teach coupling agents as additives (column 8, lines 23-49). Christie et al teach analogous compositions comprising epoxides and/or curable cyanate esters, reactive modifier and a filler that is optionally treated with a coupling agent. See column 5, lines 3-28. Swei disclose a composite filler material that is a filler material, such as silica, as a core coated with a layer of silicone elastomer. The fillers are said to be suitable for use in matrix materials such as cyanate esters. The silicone elastomer is the reaction product of a multifunctionally terminated polysiloxane and a silane crosslinking agent. The silane crosslinking agents correspond to the silanes set forth in instant claims 13, 14 and 18. See column 1, lines 30-49, column 2, lines 12-32 and column 5, lines 39-50.

With respect to claims 13-15 and 18, It would have been obvious to one skilled in the art to employ a filler such as the filler optionally treated with a coupling agent in analogous compositions taught by Christie et al as the filler in the compositions taught by Gaku et al, thus providing both filler and coupling agent. Gaku et al provide motivation by teaching addition of filler and coupling agents. Christie et al also provide motivation to employ a filler treated with a coupling agent by teaching that the treated filler is preferred. Gaku et al do not mention adding silane compounds corresponding to those set forth in claims 13, 14 and 18, however, Gaku et al teach coupling agents as additives to the disclosed compositions (column 8, lines 23-49). Christie et al teach analogous compositions comprising epoxides and/or curable cyanate esters, reactive modifier and a filler that is optionally treated with a coupling agent. See column 5, lines 3-28. It would further have been obvious to one skilled in the art to employ the composite filler material comprising a surface treated core taught by Swei as the filler in the compositions

taught by Gaku et al in combination with McCormick et al and Shimp and Christie et al. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of producing a highly filled polymeric matrix material having improved ductility and toughness, as taught by Swei. The silicone elastomer surface treatment on the filler core taught by Swei is provided by reaction of a silane crosslinking agent corresponding to the silanes set forth in the instant claims (column 4, line 40, to column 5, line 4).

With respect to claims 19 and 20, It would have been obvious to one skilled in the art at the time of the invention to employ a filler having a particle size less than 31 microns, and substantially free of alpha particle emissions, as taught by Christie et al, in the compositions taught by Gaku et al in combination with McCormick et al and Shimp. Christie et al provide motivation to employ a filler having a particle size less than 31 microns, and substantially free of alpha particle emissions so that the compositions will readily flow into gaps between a chip and substrate carrier and to avoid generation of electron/hole pairs.

(11) Response to Argument

Appellant argues that the cited references do not teach "a filler for controlling thermal expansion of said composition and for assisting in reinforcing said bond". This argument is not persuasive for the following reasons. It is the examiner's position that the recitation of intended purposes of the filler fails to distinguish the compositions instantly claimed from those disclosed in the prior art of record. Although these properties are not explicitly discussed by Gaku et al, Gaku et al teach adding fillers corresponding to the specific fillers disclosed by appellant as being useful fillers "for controlling thermal expansion of said composition and for assisting in reinforcing said bond" in the disclosed cyanate ester compositions (see page 12, line 32 to page 13, line 3, page 10, lines 1-7 and pages 24-25). Thus, the disclosed fillers would be expected to provide the same functions in the compositions as are set forth in the instant claims. Gaku

et al disclose some of the same fillers disclosed by appellant and exemplifies impregnating glass cloth (a reinforcing material) with the disclosed cyanate ester compositions. Glass cloth, as well as other fillers, reinforcing agents and/or tougheners disclosed by Gaku et al and Shimp would be expected to reinforce a bond. In any case, there is no evidence of record to show that the prior art fillers, such as glass cloth, silica, synthetic fiber cloth, alumina, etc, do not also function to control thermal expansion and reinforce the bond in cyanate ester compositions.

With respect to claim 7, appellant argues an "effective amount" of filler to provide the recited properties is not taught in the prior art. This argument is not persuasive of patentability because there is no recitation in any of the claims of "effective amount" or the disclosed amounts of 40-75 % by weight used with 60-25 % by weight of liquid resin, as disclosed on pages 25, lines 11-14. The only example of a cyanate ester compositions employs silica (see Example 4). With respect to claims 1 and 8, appellant argues that "control" of thermal expansion of the composition requires using a sufficient quantity of filler to provide the recited properties and that this quantity is not taught in the prior art. This argument is not persuasive of patentability. There is no recitation in claims 1 or 8 of an "effective amount" or any other required quantity, thus the amounts of silica and/or other kinds of fillers disclosed in the cited art would be expected to provide the same function as instantly claimed. Appellant argues that the teaching of Gaku et al that the fillers "do not impair the nature of the curable resin (A) or the cured product" implies that large amounts of filler would impair the nature of the curable resin or the cured product. This argument is not persuasive because Gaku et al do not suggest that large amounts of filler would impair the nature of the curable resin or cured products nor teach that the amount of filler would need to be limited to small amounts of filler in order not to impair the nature of the curable resin or the cured product. Appellant points to the disclosed amounts of 40-75 % by weight used with 60-25 % by weight of liquid resin, as disclosed on pages 25, lines 11-14, in the instant specification. This argument is not persuasive of patentability because there is no recitation in any of the claims of the specific amounts taught in the

specification or any evidence of the criticality of using the disclosed amounts "for controlling thermal expansion of said composition and for assisting in reinforcing said bond". Appellant's argument that the examiner has not established a *prima facie* case of obviousness with respect to recitation of the intended purpose of the filler is not persuasive because the rejection set forth in the Final Office Action clearly points out the disclosed use of fillers and reinforcing agents in the prior art compositions.

Appellant has argued previously that the prior art does not teach compositions "for reinforcing a bond". This argument is not persuasive for the following reasons. The instant claims are drawn to a composition comprising a filler and the phrase "for reinforcing a bond" merely sets forth an intended purpose of the filler in the composition. Since the prior art compositions comprise the same components as set forth in the instant claims the prior art compositions would also be expected to be useful for reinforcing a bond, in the absence of evidence to the contrary. With respect to process for reinforcing a bond set forth in claim 7, the cited prior art teaches a process comprising providing the composition set forth in the claim. The recitation of the future intended purpose "for reinforcing a bond" is not considered to be sufficient to distinguish the instantly claimed process steps from the method of providing a composition taught in the prior art.

Appellant argues that Gaku et al and McCormick et al do not teach the metal cation in the organometalllic complex salt set forth in the instant claims. This argument is no persuasive because McCormick et al clearly teach organometallic complex salts wherein the metal is selected from Groups IVB,VIB,VIIB or VIIIB. See column 4, lines 3-8. McCormick et al do not mention metal cations from group VB, however, none of the instant claims is limited to this species.

With respect to claim 6, which recites a solvent-free composition, Gaku et al disclose compositions that do not contain organic solvents. See the Examples.

With respect to claims 13-15 and 18, appellant argues that the prior art does not teach a surface treating agent selected from the silane compounds set forth in the Markush Group. This argument is not

persuasive for the following reasons. Gaku et al teach adding coupling agents to the disclosed compositions containing fillers. Christie et al teach tat the filler can optionally be treated with a coupling agent. Swei discloses surface treated filler materials wherein the silicone elastomer layer coating the core is obtained from a silane crosslinking agent containing a hydrolyzable group and a reactive group, such as vinlytrimethoxysilane (column 4, line 39, to column 5, line 4, and example 2). It is noted that it is well known in the art with respect to compositions comprising fillers to use fillers treated with reactive silanes, which are alternatively referred to as coupling agents, surface treating agents or crosslinking agents. See the motivation for combination of the teachings of these references set forth in the rejection of claims 13-15 and 18 set forth above.

Gaku et al teach compositions comprising ethylenically unsaturated monomers in addition to cyanate ester resins. However, the comprising language in the instant claim language sets forth a composition "comprising" a cyanate ester resin, a filler, a photoinitiator and additional unrecited components. The comprising language defining the composition encompasses compositions comprising ethylenically unsaturated monomers in combination with cyanate esters. The "consisting essentially of" language in the instant claims limits the cyanate ester resin to those set forth; it does not exclude other components of the composition.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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SB
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